WHAT IS CLAIMED IS:

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1. A ~~method for improving resolution of a digital representation having a~~ plurality of text or graphics pixels, comprising the steps of:

identifying a text or graphics pixel on a boundary of a text or graphics object of the digital representation; and

for each text or graphics pixel identified as on the boundary

tracing a group of pixels, including the initial boundary-identified pixel, that constitute a local boundary segment and constructing an identifier for that local boundary segment;

parameterizing and smoothing that local boundary segment, resulting in a new local boundary segment, by computing instructions for parameterizing and smoothing that local boundary segment; and

rendering the parameterized and smoothed boundary segment to improve the resolution of the text or graphics object.

2. The method of claim 1, wherein the instructions are pre-computed, stored in a look-up table, indexed by the corresponding identifier, and directly accessed during the parameterizing and smoothing of that local boundary segment.

3. The method of claim 1, wherein the constructing of the identifier is based on the relative locations of the pixels in the group that constitute the corresponding local boundary segment.

4. The method of claim 2, wherein the tracing step comprises identifying first and second contiguous sub-groups of pixels, each starting with the initial pixel and extending in first and second directions respectively relative to a known background pixel and, if available, a just-identified pixel in that sub-group, and wherein the identifier assigned to the corresponding local boundary segment is a chain-code constructed based on the tracing step.

5. The method of claim 2, wherein the tracing step comprises identifying each pixel in the group, starting from the initial pixel in the group and tracing N pixels in a first direction and N pixels in a second direction, and wherein the identifier assigned to the corresponding local boundary segment is a chain-code constructed based on a pre-determined set of rules used in the tracing step.

6. The method of claim 2, wherein the stored instructions on parameterizing and smoothing comprise a differential stored at a location in the pre-computed look-up table indexed by the corresponding identifier, the differential representing a difference between the location of at least one pixel in the new local boundary segment and the location of that pixel in the corresponding un-parameterized and un-smoothed local boundary segment.

7. The method of claim 2, wherein the stored instructions on parameterizing and smoothing comprise general occupancy information stored at a location in the pre-computed look-up table indexed by the corresponding identifier, the general occupancy information representing a difference between the location of the new local boundary segment and the location of the corresponding un-parameterized and un-smoothed local boundary segment.

8. The method of claim 1, wherein the identifying step comprises identifying each text and graphics pixel on a boundary of a text or graphics object of the digital representation, and performing the tracing, parameterizing and smoothing, and rendering for each boundary-identified pixel.

9. An apparatus for improving resolution of a digital representation having a plurality of text or graphics pixels, the apparatus comprising:

means for identifying a text or graphics pixel on a boundary of a text or graphics object of the digital representation; and

means for tracing a group of pixels, including an initial boundary-identified pixel, that constitute a local boundary segment and constructing an identifier for that local boundary segment;

means for parameterizing and smoothing that local boundary segment to generate a new local boundary segment by computing instructions for parameterizing and smoothing that local boundary segment; and

means for rendering the parameterized and smoothed boundary segment to improve the resolution of the text or graphics object.

10. The apparatus of claim 9, further comprising a look-up table for storing the instructions, which are pre-computed, such that the instructions are indexed in the look-up table by the corresponding identifier, wherein the look-up table is directly accessible by the parameterizing and smoothing means.

11. The apparatus of claim 10, wherein the identifier is based on the relative locations of the pixels in the group that constitute the corresponding local boundary segment.

12. The apparatus of claim 10, wherein the tracing means is configured to identify first and second contiguous sub-groups of pixels, each starting with the initial pixel and extending in first and second directions respectively relative to a known background pixel and, if available, a just-identified pixel in that sub-group, and wherein the identifier assigned to the corresponding local boundary segment is a chain-code constructed based on the tracing performed by the tracing means.

13. The apparatus of claim 10, wherein the tracing means is configured to identify each pixel in the group, starting from the initial pixel in the group and tracing N pixels in a first direction and N pixels in a second direction, and wherein the identifier assigned to the corresponding local boundary segment is a chain-code constructed based on a pre-determined set of rules used in the tracing step.

14. The apparatus of claim 10, wherein the stored instructions on parameterizing and smoothing comprise a differential stored at a location in the pre-computed look-up table indexed by the corresponding identifier, the differential representing a difference between the location of at least one pixel in the new local boundary

segment and the location of that pixel in the corresponding un-parameterized and un-smoothed local boundary segment.

15. The apparatus of claim 10, wherein the stored instructions on parameterizing and smoothing comprise general occupancy information stored at a location in the pre-computed look-up table indexed by the corresponding identifier, the general occupancy information representing a difference between the location of the new local boundary segment and the location of the corresponding un-parameterized and un-smoothed local boundary segment.

16. The apparatus of claim 9, wherein the identifying means is configured to identify each text and graphics pixel on a boundary of a text or graphics object of the digital representation, and wherein the tracing, parameterizing and smoothing, and rendering means are each configured to operate on each boundary-identified pixel.

17. A machine-readable medium having a program of instructions for directing a machine to improve resolution of a digital representation having a plurality of text or graphics pixels, the program of instructions comprising:

instructions for identifying a text or graphics pixel on a boundary of a text or graphics object of the digital representation; and

for each text or graphics pixel identified as on the boundary

instructions for tracing a group of pixels, including the initial boundary-identified pixel, that constitute a local boundary segment and constructing an identifier for that local boundary segment;

instructions for parameterizing and smoothing that local boundary segment, resulting in a new local boundary segment, by computing directions for parameterizing and smoothing that local boundary segment; and

instructions for rendering the parameterized and smoothed boundary segment to improve the resolution of the text or graphics object.

18. The machine-readable medium of claim 17, wherein the directions are pre-computed, stored in a look-up table, indexed by the corresponding identifier, and directly accessed during the parameterizing and smoothing of that local boundary segment.

19. The machine-readable medium of claim 17, wherein the constructing of the identifier is based on the relative locations of the pixels in the group that constitute the corresponding local boundary segment.

20. The machine-readable medium of claim 18, wherein the tracing instructions comprises identifying first and second contiguous sub-groups of pixels, each starting with the initial pixel and extending in first and second directions respectively relative to a known background pixel and, if available, a just-identified pixel in that sub-group, and wherein the identifier assigned to the corresponding local boundary segment is a chain-code constructed based on the tracing.

21. The machine-readable medium of claim 18, wherein the tracing instructions comprises identifying each pixel in the group, starting from the initial pixel in the group and tracing N pixels in a first direction and N pixels in a second direction, and wherein the identifier assigned to the corresponding local boundary segment is a chain-code constructed based on a pre-determined set of rules used in the tracing.

22. The machine-readable medium of claim 18, wherein the stored directions on parameterizing and smoothing comprise a differential stored at a location in the pre-computed look-up table indexed by the corresponding identifier, the differential representing a difference between the location of at least one pixel in the new local boundary segment and the location of that pixel in the corresponding un-parameterized and un-smoothed local boundary segment.

23. The machine-readable medium of claim 18, wherein the stored directions on parameterizing and smoothing comprise general occupancy information stored at a location in the pre-computed look-up table indexed by the corresponding identifier, the general occupancy information representing a difference between the location of

the new local boundary segment and the location of the corresponding un-parameterized and un-smoothed local boundary segment.

24. The machine-readable medium of claim 17, wherein the identifying instructions comprises identifying each text and graphics pixel on a boundary of a text or graphics object of the digital representation, and performing the tracing, parameterizing and smoothing, and rendering for each boundary-identified pixel.

25. A method for constructing a chain-code-addressable look-up table for use with an algorithm for improving resolution of a digital representation, the method comprising the steps of:

tracing a plurality of M-pixel-length segments that may be encountered on a boundary of a text or graphics object in such a digital representation, where M is an integer greater than or equal to 3;

constructing a chain-code identifying each M-pixel-length pixel segment during the tracing of that segment, each chain-code being an index to the look-up table; and

developing instructions for smoothing each M-pixel-length segment and storing the instructions for each segment with its chain-code in the look-up table.

26. The method of claim 25, wherein, for each M-pixel-length segment traced, the correspondingly constructed chain-code identifies first and second contiguous sub-groups of pixels, each starting with a current pixel and extending in first and second directions respectively relative to a known background pixel and, if available, a just-identified pixel in that sub-group.

27. The method of claim 25, wherein the developed instructions comprises a plurality of computed differentials, each representing a difference between the location of at least one pixel in a respective one of the smoothed M-pixel-length segments and the location of that pixel in the corresponding un-smoothed M-pixel-length segment.

28. The method of claim 25, wherein the developed instructions comprises a plurality of computed general occupancy information sets, each representing a difference between the location of a respective one of the smoothed M-pixel-length segments and the location of the corresponding un-smoothed M-pixel-length segment.

29. The method of claim 25, wherein M is 7 or 9.

30. A chain-code-addressable look-up table for use with a resolution improvement algorithm, the look-up table comprising:

a plurality of chain-codes, each identifying a distinct multiple pixel segment that may be encountered on a boundary of a text or graphics object, each chain-code being an index to the look-up table, and

a plurality of sets of general occupancy information, one set for each multiple pixel segment, each set being located at an address in the look-up table to which the chain-code of the corresponding multiple pixel boundary segment is indexed, and each set of general occupancy information providing instructions for smoothing the corresponding multiple pixel boundary segment.

31. The chain-code-addressable look-up table of claim 30, wherein the plurality of sets of general occupancy information comprises differentials, one for each multiple pixel segment, each differential being located at an address in the look-up table to which the chain-code of the corresponding multiple pixel boundary segment is indexed, and each differential providing instructions for smoothing the corresponding multiple pixel boundary segment.

32. The chain-code-addressable look-up table of claim 31, wherein each differential represents a difference between the location of at least one pixel in a smoothed multiple pixel boundary segment and the location of that pixel in an un-smoothed multiple pixel boundary segment.